

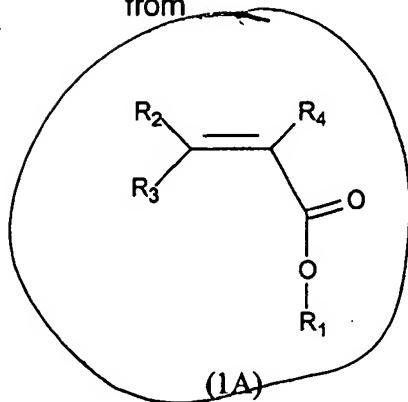
Claims

1. A photoresist composition comprising:

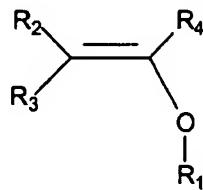
a) a polymer that is insoluble in an aqueous alkaline solution and comprises at least one acid labile group, and comprises at least one monomer unit having a pendant group selected from unsubstituted or substituted higher adamantanes and mixtures thereof; and

b) a compound capable of producing an acid upon irradiation.

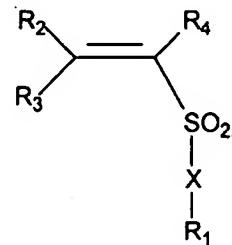
10 2. The photoresist composition of claim 1 wherein the monomer unit is selected from



(1A)



(1B)



(1C)

wherein

15 R_1 is $-Z$ or $-Y-Z$ where Y is a linear or branched alkylene or a monocyclic or polycyclic alkylene, Z is unsubstituted or substituted higher adamantane; R_2 , R_3 , and R_4 are each independently selected from hydrogen, alkyl, alkoxyalkyl, cycloalkyl, cycloalkenyl, aryl, aralkyl, and CN or any two of R_2 , R_3 , and R_4 together with the carbon atoms to which they are attached form an unsubstituted or substituted mono-
20 or polycycloalkenyl; X is O or NR_2 .

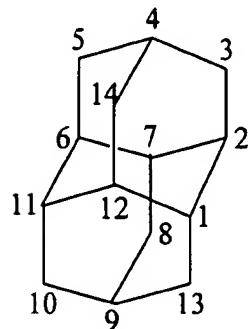
3. The photoresist composition of claim 2 wherein the monomer unit is

R₁ is -Z or -Y-Z where Y is a linear or branched alkylene or a monocyclic or polycyclic alkylene, Z is unsubstituted or substituted higher adamantane; R₂, R₃, and R₄ are each independently selected from hydrogen, alkyl, alkoxyalkyl, cycloalkyl, cycloalkenyl, aryl, aralkyl, and CN or any two of R₂, R₃, and R₄ together with the 5 carbon atoms to which they are attached form an unsubstituted or substituted mono- or polycycloalkenyl; X is O or NR₂.

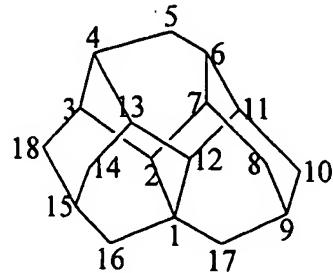
Examples of higher adamantanes include diamantane, triamantane, and tetramantane. In general, adamantanes have the general formula of C_(4k+6)H_(4k+12) where k = 0, 1, 2, 3, and so on. When k is 0, the formula is that of adamantane; 10 when k is 1, the formula is that of diamantane; when k is 2, the formula is that of triamantane, and so forth.

The IUPAC numbering scheme for diamantane and triamantane is shown below (from United States Patent No. 5019660 and United States Patent No. 5576355)

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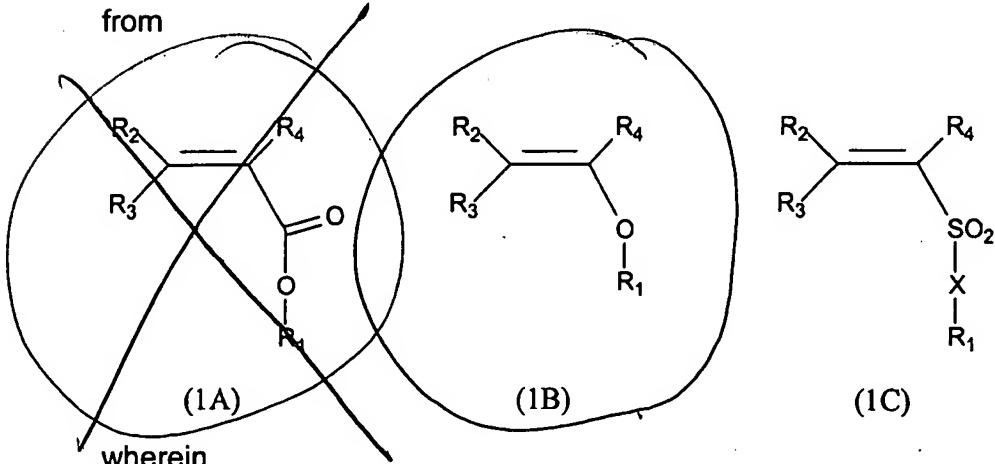
Diamantane



Triamantane

20 Examples of structures for Z include, for example, 3- (or 5-)alkyl-diamantanes and 5- or 18-alkyl-triamantanes, e.g.,

Claims

1. A photoresist composition comprising:
 - a) a polymer that is insoluble in an aqueous alkaline solution and comprises at least one acid labile group, and comprises at least one monomer unit having a pendant group selected from unsubstituted or substituted higher adamantanes and mixtures thereof; and
 - b) a compound capable of producing an acid upon irradiation.
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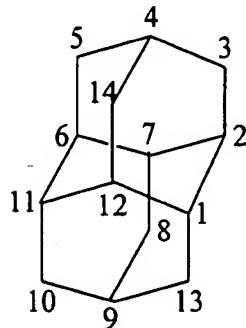
wherein
- 15 R₁ is -Z or -Y-Z where Y is a linear or branched alkylene or a monocyclic or polycyclic alkylene, Z is unsubstituted or substituted higher adamantane; R₂, R₃, and R₄ are each independently selected from hydrogen, alkyl, alkoxyalkyl, cycloalkyl, cycloalkenyl, aryl, aralkyl, and CN or any two of R₂, R₃, and R₄ together with the carbon atoms to which they are attached form an unsubstituted or substituted mono- or polycycloalkenyl; X is O or NR₂.
- 20 3. The photoresist composition of claim 2 wherein the monomer unit is

R₁ is -Z or -Y-Z where Y is a linear or branched alkylene or a monocyclic or polycyclic alkylene, Z is unsubstituted or substituted higher adamantane; R₂, R₃, and R₄ are each independently selected from hydrogen, alkyl, alkoxyalkyl, cycloalkyl, cycloalkenyl, aryl, aralkyl, and CN or any two of R₂, R₃, and R₄ together with the 5 carbon atoms to which they are attached form an unsubstituted or substituted mono- or polycycloalkenyl; X is O or NR₂.

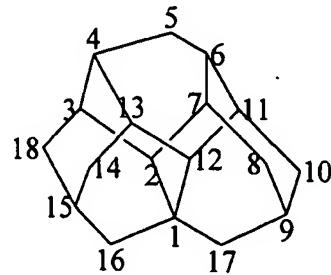
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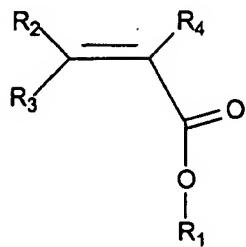


Triamantane

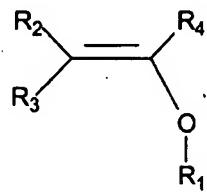
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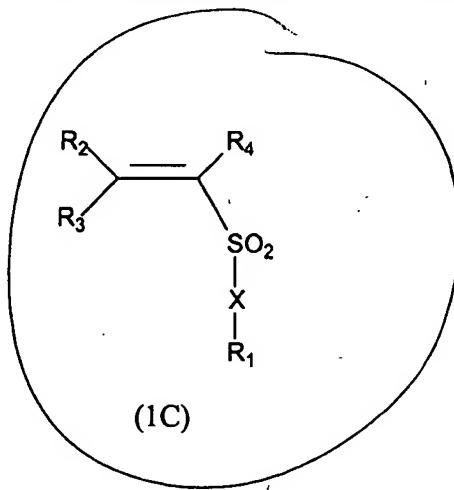
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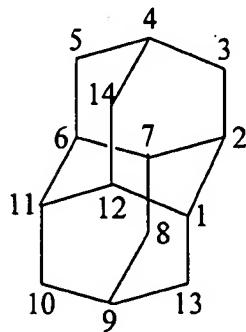
3. The photoresist composition of claim 2 wherein the monomer unit is

R₁ is -Z or -Y-Z where Y is a linear or branched alkylene or a monocyclic or polycyclic alkylene, Z is unsubstituted or substituted higher adamantane; R₂, R₃, and R₄ are each independently selected from hydrogen, alkyl, alkoxyalkyl, cycloalkyl, cycloalkenyl, aryl, aralkyl, and CN or any two of R₂, R₃, and R₄ together with the 5 carbon atoms to which they are attached form an unsubstituted or substituted mono- or polycycloalkenyl; X is O or NR₂.

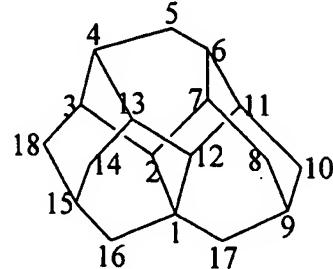
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